

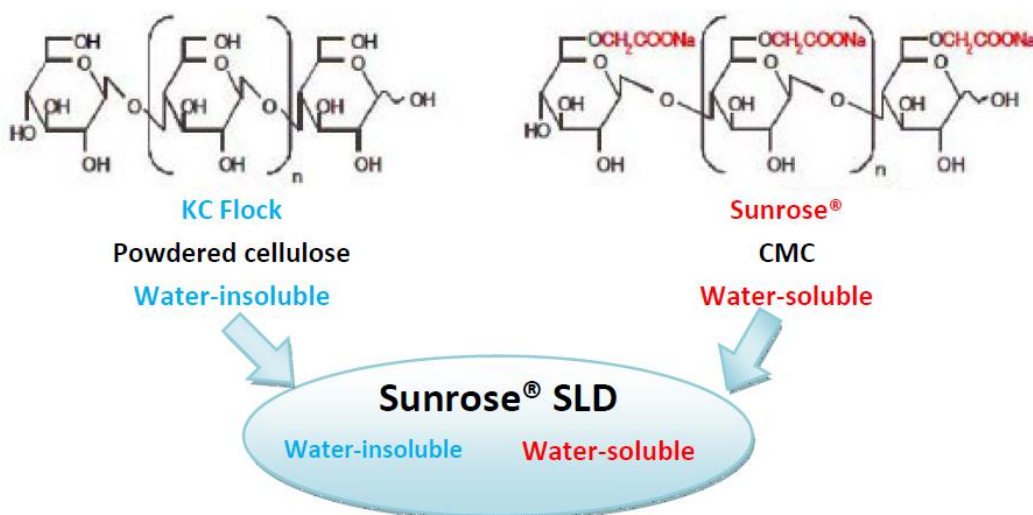


## Water-insoluble sodium carboxymethyl cellulose

## Sunrose® SLD Series

## - Product outline -

Sunrose® is a carboxymethyl cellulose (CMC) produced from carboxymethylated high-purity and biodegradable cellulose that is widely used in various fields and is not only harmless to humans but also features slow biodegradability, making it easy on the environment. NIPPON PAPER CHEMICALS has also developed Sunrose® SLD, slightly carboxymethylated cellulose. This type of CMC combines properties of both powdered cellulose and CMC.



## General quality

Product	SLD-F1	SLD-FM
Appearance	Powder	Fine powder
Average particle size (μm)	50-60μm	15-20μm
Moisture (%)	less than 10.0%	
PH	6.0-8.0	
1% viscosity (mPa·s)	50-150mPa·s	
Degree of etherification (mol/C6)	0.20-0.30mol/C6	
Purity (%)	99.0% or greater	

## Basic performance

- SLD Series **swells** in both cold and warm water, dissolving slightly but not completely, and becomes **mildly viscous**.
- In water SLD Series exhibits **superb dispersion stability and degradability**.
- SLD Series **prevents other** suspended particles **from caking and redisperses them**.
- SLD Series exhibits excellent **water absorption, water retention, shape retention, foam stability, and emulsion stability**.
- **By absorbing highly concentrated sugar solutions, it prevents “weeping”**.

**Application fields**

Food	Beverages (cocoa, juices containing fiber and pulp, Shiruko, Amazake, etc.); Soups (corn soups, ramen soups, miso soups, consommés); sauces, dressings, ketchups, mayonnaise, jam, and yogurts; whip cream, fillings; tablet disintegrating agents (supplements, etc.); dried goods (dry processed foods, instant ramen, pasta noodles); ice creams, soft ice cream Monakas, edible films, confectionaries (gummies, soft candies); bread (sweet breads, cream-filled breads); other processed foods and ingredients for food processing (powdered azuki, etc.)
Cosmetics	Face powders, foundations, scrub face-washes, facial masks, face-wash foams, face-wash creams, hair mousses, shampoos, soaps, lotions, hair dyes, hair bleaches, mascaras, eye-liners, nails, antiperspirants
Daily goods	Toothpastes; cleansers for kitchen utensils, bathtubs, tiles, cars, etc.; pet foods; air-fresheners; disposable paper toilet seat covers; water-dissolving papers, nonwoven fabrics, etc.
Papers	Paper strengthener, water retention agent, coating agent, bulky papers, yield improving (oxidized titanium, etc.), etc.
Milk substitutes	Dispersion of plant proteins, emulsion stability, improvement in moisture-retaining properties
Filtration (water removal)	Cooking oils, various solvents
Building material	Fiber walls, sand walls, gypsum boards, etc.
Civil engineering	Air bubble shields
Resin fillers, compounds	Styrene foams, biodegradable resins, rubber, ceramics, vinyl chlorides
Paint, varnish, artificial leather	Matte paints, architectural coating/paints, interior coating/paints for vehicles, etc.
Dispersant	Carbon black fine particles, barium sulfate (x-ray contrast agent), oxidized titanium, dispersion of zinc oxide, etc.
Moisture absorption aid	Improves shape retention properties of materials such as calcium chloride and other deliquescent agents when absorbing moisture
Others	Fiber (texture modifier for fabrics and threads), fluid carriers, lubricants, etc.

For more details on our products, please contact:

**NIPPON PAPER INDUSTRIES CO., LTD.** Innovative Material Sales  
4-6 Kandasurugadai, Chiyoda-ku, Tokyo 101-0062, Japan  
Tel: 81- (0) 3-6665-1050



## Technical Information

Water-insoluble sodium carboxymethyl cellulose

**Sunrose® SLD-F1**

### — The swelling property before and after freezing —

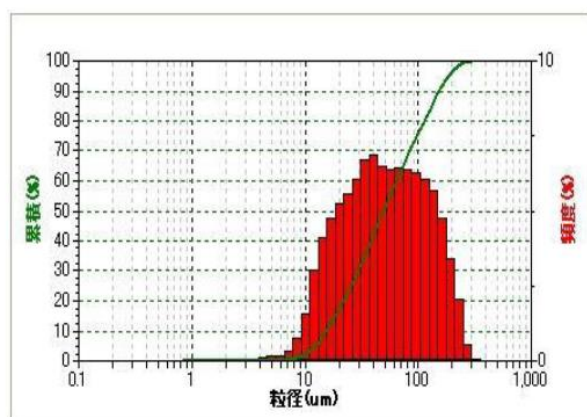
When **Sunrose® SLD-F1** is dispersed in water, the **carboxymethylated portion will absorb water and swell**. However it does not swell in organic solvents such as methanol. Therefore **grain size distribution and average particle size will vary depending on the solvent**.



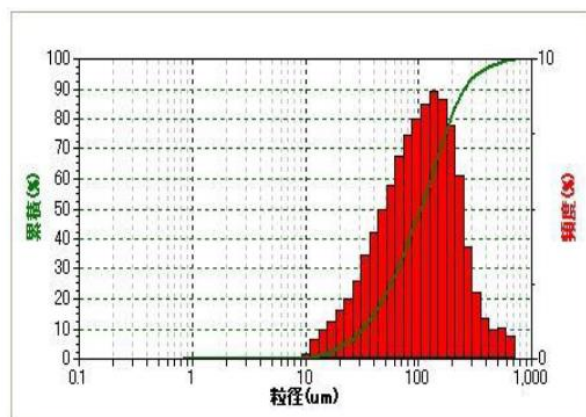
Particles in **methanol**



Particles in **water**



**Methanol** (Average particle size  $51.4 \mu\text{m}$ )



**Water** (Average particle size  $101.6 \mu\text{m}$ )

#### The swelling property before and after freezing

Grade	Sample	Before freezing			Freezing→ Thawing*2 1st	Freezing→ Thawing 2nd
		Average particle diameter( $\mu\text{m}$ ) Solvent :Methanol	Average particle diameter( $\mu\text{m}$ ) Solvent :Water	Swelling ratio(%) *1	Swelling ratio(%)	Swelling ratio(%)
SLD-F1	①	51.4	101.6	197.7	202.9	237.0
	②	45.6	99.6	218.4	251.1	270.4
	③	46.7	101.0	216.3	255.5	285.4

\*1 (Particle diameter in Water) / (Particle diameter in Methanol)  $\times 100$

\*2 Freezing:-20°C、Thawing;40°C

**After freezing SLD-F1, expensive swelling property is maintained.**

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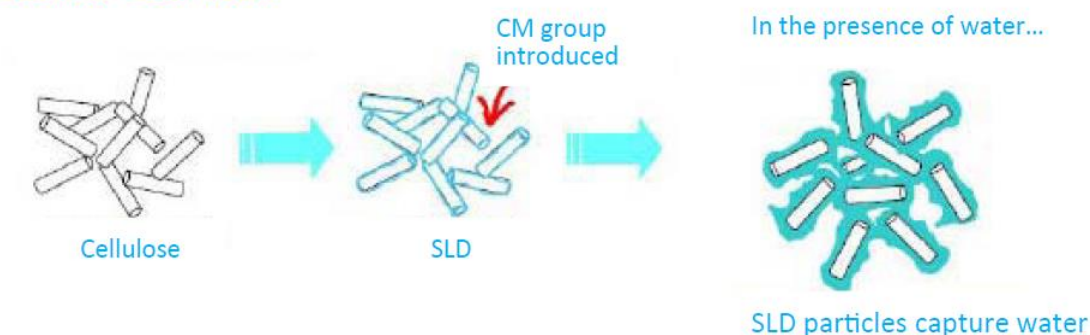
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## Water-insoluble sodium carboxymethyl cellulose Sunrose® SLD Series – Water absorption –

Sunrose® is a carboxymethyl cellulose (CMC) produced from carboxymethylated natural cellulose that is widely used in various fields and is not only harmless to humans but is also biodegradable, making it environmentally friendly. NIPPON PAPER CHEMICALS has also developed Sunrose® SLD, slightly carboxymethylated cellulose. This type of CMC combines properties of both powdered cellulose and CMC.

### Sunrose® SLD model



### Water absorption of Sunrose® SLD Series

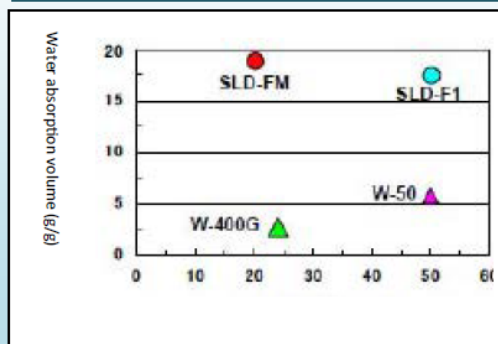
Comparison between powdered cellulose and SLD for average particle size and water absorption

Product	KC Flock (powdered cellulose)		Sunrose® SLD	
	W-50	W-400G	SLD-F1	SLD-FM
Average particle size (μm)	50	24	50	20
Water absorption volume (g/g)	5.7	2.7	17.5	19.0

Sunrose® SLD Series increases its water absorbency by 3 to 7 times compared to powdered cellulose products, ensuring better water retention.

### Water-absorption testing

Drip water on a 1-gram sample and measure water absorption (grams of water per gram of sample) to the point where the water begins to seep out.



Comparison between powdered cellulose and Sunrose® SLD for average particle size and water absorption

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## Water-insoluble sodium carboxymethyl cellulose **Sunrose® SLD Series** – Emulsion stability –

When Sunrose® SLD Series is dispersed in water, the carboxymethylated portion will absorb water and swell, forming a three-dimensional structure.

### Emulsion stability of Sunrose® SLD Series

#### Method for emulsion preparation

An emulsion is prepared by adding each agent (0.5%) to a mixture of water and vegetable oil (50:50), which is then agitated for 5 minutes with a Homo Mixer at 8,000rpm.

Day 1



Day 7



Samples: 1) SLD Series, 2) commercial cellulose formula, 3) CMC, 4) powdered cellulose, 5) control, 6) SLD Series

In an emulsion using the SLD Series, minute drops of oil are dispersed and held within the three-dimensional mesh structure. By preventing the oil droplets from clustering, SLD Series ensures the emulsion remains stable.

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## Water-insoluble sodium carboxymethyl cellulose **Sunrose® SLD-FM** – Cocoa beverage application –

Sunrose® SLD-FM features excellent dispersion stability in water. When used for preparing colloid beverages such as cocoa, it exhibits **superb anti-caking and redispersion properties**.

### Recipe for cocoa beverage sample

Sample	1	2	3
Cocoa powder (marketed product)	1.0	←	←
Water	99.0	←	←
Third-party cellulose formula	0	0.2	0
SLD-FM	0.2	0	0

Weight section

After preparing a 1% cocoa solution, a predetermined amount of each sample was added and mixed well (stabilizer: 0.2%).

24 hours after preparation



1. SLD-FM
2. Competitor's Products
3. Control

### Redispersion characteristics of SLD-FM

When the bottles are shaken once



Each exhibits settling



Shaken twice...



Some redispersion



Shaken three-times



Thorough redispersion of SLD



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